

AMENDMENT TO THE CLAIMS

1. (Previously Presented) A multibeam scanning optical apparatus

comprising:

a light source having a plurality of light beam emitting sections;

a light deflector for deflecting a plurality of light beams emitted respectively from the plurality of light beam emitting sections of said light source;

a scanning optical system for focusing the plurality of light beams deflected by said light deflector on a surface to be scanned; and

a photodetector for controlling a timing of a start of scanning of the plurality of light beams by detecting at least one of the plurality of light beams deflected by said light deflector as at least one detection light beam,

wherein the timing of the start of scanning is controlled to align the centers of scanning areas of the plurality of light beams with each other on the surface to be scanned while allowing starting points of scanning of the plurality of light beams to differ from each other when the plurality of light beams have respective wavelengths that are different from each other.

2. (Previously Presented) A multibeam scanning optical apparatus

according to claim 1, further comprising:

a detection optical element for converging the at least one detection light beam and leading the at least one detection light beam to said photodetector,

wherein said detection optical element has its optical surfaces arranged orthogonally relative to the at least one detection light beam.

3. (Original) A multibeam scanning optical apparatus according to claim 2, wherein said detection optical element comprises an anamorphic lens.

4. (Original) A multibeam scanning optical apparatus according to claim 2, wherein said detection optical element is made of a plastic material.

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5. (Original) A multibeam scanning optical apparatus according to claim 2, wherein said scanning optical system comprises a refraction optical element and a diffraction optical element.

6. (Original) A multibeam scanning optical apparatus according to claim 5, wherein said refraction optical element and said diffraction optical element are made of a plastic material.

7. (Original) A multibeam scanning optical apparatus according to claim 6, wherein said detection optical element and said refraction optical element are integrally formed by using a plastic material.

8. (Previously Presented) A multibeam scanning optical apparatus according to claim 2, further comprising an incident optical system for leading the plurality of light beams emitted from said light source to said optical deflector.

9. (Previously Presented) A multibeam scanning optical apparatus according to claim 8, wherein said incident optical system comprises a first lens for collimating each of said plurality of light beams emitted from said light source and a second lens for focusing each of said plurality of collimated light beams on the deflection plane of the optical deflector as a linear image extending in the main-scanning direction.

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10. (Original) A multibeam scanning optical apparatus according to claim 9, wherein said detection optical element and said second lens are integrally formed by using a plastic material.

11. (Canceled)

12. (Previously Presented) A multibeam scanning optical apparatus comprising:
a light source having a plurality of light emitting sections;
a light deflector for deflecting a plurality of light beams emitted respectively from said plurality of light emitting sections of said light source;

a scanning optical system for focusing the plurality of light beams deflected by said light deflector on a surface to be scanned;

a first detection optical element for converging at least one of the plurality of light beams deflected by said light deflector as at least one detection light beam;

a second detection optical element for focusing the at least one detection light beam converged by said first detection optical element; and

a photodetector for controlling a time of a start of scanning of the plurality of light beams by detecting the at least one detection light beam focused by said second detection optical element,

wherein said first detection optical element has its optical surfaces arranged orthogonally relative to an arrangement direction of the at least one detection light beam.

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13. (Previously Presented) A multibeam scanning optical apparatus according to claim 12, wherein said first detection optical element comprises an anamorphic lens.

14. (Previously Presented) A multibeam scanning optical apparatus according to claim 12, wherein said first detection optical element is made of a plastic material.

15. (Original) A multibeam scanning optical apparatus according to claim 12, wherein said scanning optical system comprises a refraction optical element and a diffraction optical element.

16. (Original) A multibeam scanning optical apparatus according to claim 15, wherein said refraction optical element and said diffraction optical element are made of a plastic material.

17. (Previously Presented) A multibeam scanning optical apparatus according to claim 16, wherein said first detection optical element and said refraction optical element are integrally formed by using a plastic material.

18. (Previously Presented) A multibeam scanning optical apparatus according to claim 12, further comprising an incident optical system for leading the plurality of light beams emitted from said light source to said light deflector.

19 to 39. (Canceled)

40. (Currently Amended) An image forming apparatus comprising:
a multibeam scanning optical apparatus as defined in any one of claims 1 to 10, 12 to 18 and 42 to 62 55; and
an image carrier arranged on the surface to be scanned.

41. (Canceled)

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42. (Previously Presented) A multibeam scanning optical apparatus comprising:

- a light source having a plurality of light emitting sections;
- a light deflector for deflecting a plurality of light beams emitted respectively from the plurality of light emitting sections of said light source;
- a scanning optical system for focusing the plurality of light beams deflected by said light deflector on a surface to be scanned;
- a photodetector for controlling a timing of a start of scanning of the plurality of light beams by detecting at least one of the plurality of light beams deflected by said light deflector as at least one detection light beam; and
- a detection optical element for converging the at least one detection light beam and leading it to said photodetector, said detection optical element having a refractive power in the main-scanning direction,

wherein said detection optical element has its optical surfaces arranged orthogonally relative to an arrangement direction of the at least one detection light beam.

43. (Previously Presented) A multibeam scanning optical apparatus according to claim 42, wherein said detection optical element comprises an anamorphic lens.

44. (Previously Presented) A multibeam scanning optical apparatus according to claim 42, wherein said detection optical element is made of a plastic material.

45. (Previously Presented) A multibeam scanning optical apparatus according to claim 42, wherein said scanning optical system comprises a refraction optical element and a diffraction optical element.

46. (Previously Presented) A multibeam scanning optical apparatus according to claim 45, wherein said refraction optical element and said diffraction optical element are made of a plastic material.

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47. (Previously Presented) A multibeam scanning optical apparatus according to claim 46, wherein said detection optical element and said refraction optical element are integrally formed by using a plastic material.

48. (Previously Presented) A multibeam scanning optical apparatus according to claim 42, further comprising an incident optical system for leading the plurality of light beams emitted from said light source to said light deflector.

49. (Previously Presented) A multibeam scanning optical apparatus comprising:
a light source having a plurality of light emitting sections;
a light deflector for deflecting a plurality of light beams emitted respectively from the plurality of light emitting sections of said light source;

a scanning optical system for focusing the plurality of light beams deflected by said light deflector on a surface to be scanned;

a photodetector for controlling a timing of a start of scanning of the plurality of light beams by detecting at least one of the plurality of light beams deflected by said light deflector as at least one detection light beam; and

a detection optical element for converging the at least one detection light beam and leading it to said photodetector,

wherein said photodetector and the center of a scanning width in the main scanning direction on the surface to be scanned are held optically equivalent.

50. (Previously Presented) A multibeam scanning optical apparatus according to claim 49, wherein said detection optical element comprises an anamorphic lens.

51. (Previously Presented) A multibeam scanning optical apparatus according to claim 49, wherein said detection optical element is made of a plastic material.

52. (Previously Presented) A multibeam scanning optical apparatus according to claim 49, wherein said scanning optical system comprises a refraction optical element and a diffraction optical element.

53. (Previously Presented) A multibeam scanning optical apparatus according to claim 52, wherein said refraction optical element and said diffraction optical element are made of a plastic material.

54. (Previously Presented) A multibeam scanning optical apparatus according to claim 53, wherein said detection optical element and said refraction optical element are integrally formed by using a plastic material.

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55. (Previously Presented) A multibeam scanning optical apparatus according to claim 49, further comprising an incident optical system for leading the plurality of light beams emitted from said light source to said light deflector.

56. (Currently Amended) A multibeam scanning optical apparatus according to claim 1, wherein said photodetector controls a time of a start of scanning of the plurality of light ~~beam~~ beams by detecting all of the plurality of light beams deflected by said light deflector as detection light beams.

57. (Currently Amended) A multibeam scanning optical apparatus according to claim 12, wherein said photodetector controls a time of a start of scanning of the plurality of light ~~beam~~ beams by detecting all of the plurality of light beams deflected by said light deflector as detection light beams.

58. (Currently Amended) A multibeam scanning optical apparatus according to claim 42, wherein said photodetector controls a time of a start of scanning of the plurality of light ~~beam~~ beams by detecting all of the plurality of light beams deflected by said light deflector as detection light beams.

59. (Currently Amended) A multibeam scanning optical apparatus according to claim 49, wherein said photodetector controls a time of a start of scanning of the plurality of light ~~beam~~ beams by detecting all of the plurality of light beams deflected by said light deflector as detection light beams.

60. (Previously Presented) A multibeam scanning optical apparatus according to claim 12, wherein the plurality of light beams have respective wavelengths that are different from each other.

61. (Previously Presented) A multibeam scanning optical apparatus according to claim 42, wherein the plurality of light beams have respective wavelengths that are different from each other.

62. (Previously Presented) A multibeam scanning optical apparatus according to claim 49, wherein the plurality of light beams have respective wavelengths that are different from each other.

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63. (New) An image forming apparatus comprising:

light source means including a plurality of light beam emitting sections;

light deflector means for deflecting a plurality of light beams emitted respectively from the plurality of light beam emitting sections;

scanning optical system means for focusing the plurality of light beams deflected by said light deflector means on at least one surface to be scanned;

photodetector means for controlling a timing of a start of scanning of the plurality of light beams by detecting at least one of the plurality of light beams deflected by said light deflector means as at least one detection light beam; and

at least one image carrier arranged on the at least one surface to be scanned,

wherein the timing of the start of scanning is controlled to align the centers of scanning areas of the plurality of light beams with each other on the at least one surface to be scanned while allowing starting points of scanning of the plurality of light beams to differ from each other when the plurality of light beams have respective wavelengths that are different from each other.

64. (New) An image forming apparatus comprising:

light source means including a plurality of light beam emitting sections;

light deflector means for deflecting a plurality of light beams emitted respectively from the plurality of light beam emitting sections;

scanning optical system means for focusing the plurality of light beams deflected by said light deflector means on at least one surface to be scanned;

first detection optical element means for converging at least one of the plurality of light beams deflected by said light deflector means as at least one detection light beam;

second detection optical element means for focusing the at least one of detection light beam converged by said first detection optical element means;

photodetector means for controlling a timing of a start of scanning of the plurality of light beams by detecting the at least one detection light beam focused by said second optical element means; and

at least one image carrier arranged on the at least one surface to be scanned, wherein said first detection optical element has its optical surfaces arranged orthogonally relative to an arrangement direction of the at least one detection light beam.

65. (New) An image forming apparatus comprising:

light source means including a plurality of light beam emitting sections;

light deflector means for deflecting a plurality of light beams emitted respectively from the plurality of light beam emitting sections;

scanning optical system means for focusing the plurality of light beams deflected by said light deflector means on at least one surface to be scanned;

photodetector means for controlling a timing of a start of scanning of the plurality of light beams by detecting at least one of the plurality of light beams deflected by said light deflector means as at least one detection light beam;

detection optical element means for converging the at least one detection light beam and leading it to said photodetector means, said detection optical element means having a refractive power in the main-scanning direction; and

at least one image carrier arranged on the at least one surface to be scanned, wherein said detection optical element has its optical surfaces arranged orthogonally relative to an arrangement direction of the at least one detection light beam.

66. (New) An image forming apparatus comprising:

light source means including a plurality of light beam emitting sections;

light deflector means for deflecting a plurality of light beams emitted respectively from the plurality of light beam emitting sections;

scanning optical system means for focusing the plurality of light beams deflected by said light deflector means on at least one surface to be scanned;

photodetector means for controlling a timing of a start of scanning of the plurality of light beams by detecting at least one of the plurality of light beams deflected by said light deflector means as at least one detection light beam;

detection optical element means for converging the at least one detection light beam and leading it to said photodetector means; and

at least one image carrier arranged on the at least one surface to be scanned, wherein said photodetector means and the center of a scanning width in the main scanning direction on the at least one surface to be scanned are held optically equivalent.

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67. (New) A multibeam scanning optical apparatus comprising:

- a light source having a plurality of light beam emitting sections;
- a light deflector for deflecting a plurality of light beams emitted respectively from the plurality of light beam emitting sections of said light source;
- a scanning optical system for focusing the plurality of light beams deflected by said light deflector on a surface to be scanned; and
- a photodetector for controlling a timing of a start of scanning of the plurality of light beams by detecting at least one of the plurality of light beams deflected by said light deflector as at least one detection light beam,

wherein the at least one detection light beam does not pass through said scanning optical system, and

wherein the timing of the start of scanning is controlled to align the centers of scanning areas of the plurality of light beams with each other on the surface to be scanned while allowing starting points of scanning of the plurality of light beams to differ from each other when the plurality of light beams have respective wavelengths that are different from each other.

68. (New) A multibeam scanning optical apparatus comprising:

- a light source having a plurality of light emitting sections;
- a light deflector for deflecting a plurality of light beams emitted respectively from said plurality of light emitting sections of said light source;

a scanning optical system for focusing the plurality of light beams deflected by said light deflector on a surface to be scanned;

a first detection optical element for converging at least one of the plurality of light beams deflected by said light deflector as at least one detection light beam;

a second detection optical element for focusing the at least one detection light beam converged by said first detection optical element; and

a photodetector for controlling a time of a start of scanning of the plurality of light beams by detecting the at least one detection light beam focused by said second detection optical element,

wherein said first detection optical element has its optical surfaces arranged orthogonally relative to an arrangement direction of the at least one detection light beam, and

wherein the at least one detection light beam does not pass through any optical element having a surface that is not arranged orthogonally relative to the at least one detection light beam.

69. (New) A multibeam scanning optical apparatus according to claim 68, wherein the at least one detection light beam does not pass through said scanning optical system.

70. (New) A multibeam scanning optical apparatus comprising:

a light source having a plurality of light emitting sections;

a light deflector for deflecting a plurality of light beams emitted respectively from the plurality of light emitting sections of said light source;

a scanning optical system for focusing the plurality of light beams deflected by said light deflector on a surface to be scanned;

a photodetector for controlling a timing of a start of scanning of the plurality of light beams by detecting at least one of the plurality of light beams deflected by said light deflector as at least one detection light beam; and

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a detection optical element for converging the at least one detection light beam and leading it to said photodetector, said detection optical element having a refractive power in the main-scanning direction,

wherein said detection optical element has its optical surfaces arranged orthogonally relative to an arrangement direction of the at least one detection light beam, and

wherein the at least one detection light beam does not pass through any optical element having a surface that is not arranged orthogonally relative to the at least one detection light beam.

71. (New) A multibeam scanning optical apparatus according to claim 69, wherein the at least one detection light beam does not pass through said scanning optical system.

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72. (New) A multibeam scanning optical apparatus comprising:

- a light source having a plurality of light emitting sections;
- a light deflector for deflecting a plurality of light beams emitted respectively from the plurality of light emitting sections of said light source;
- a scanning optical system for focusing the plurality of light beams deflected by said light deflector on a surface to be scanned;
- a photodetector for controlling a timing of a start of scanning of the plurality of light beams by detecting at least one of the plurality of light beams deflected by said light deflector as at least one detection light beam; and
- a detection optical element for converging the at least one detection light beam and leading it to said photodetector,

wherein the at least one detection light beam does not pass through said scanning optical system, and

wherein said photodetector and the center of a scanning width in the main scanning direction on the surface to be scanned are held optically equivalent.

73. (New) An image forming apparatus comprising:

- a multibeam scanning optical apparatus as defined in any one of claims 67 to 72; and
- an image carrier arranged on the surface to be scanned.

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74. (New) An image forming apparatus comprising:

light source means including a plurality of light beam emitting sections;

light deflector means for deflecting a plurality of light beams emitted respectively from the plurality of light beam emitting sections;

scanning optical system means for focusing the plurality of light beams deflected by said light deflector means on at least one surface to be scanned;

photodetector means for controlling a timing of a start of scanning of the plurality of light beams by detecting at least one of the plurality of light beams deflected by said light deflector means as at least one detection light beam; and

at least one image carrier arranged on the at least one surface to be scanned,

wherein the at least one detection light beam does not pass through said scanning optical system, and

wherein the timing of the start of scanning is controlled to align the centers of scanning areas of the plurality of light beams with each other on the at least one surface to be scanned while allowing starting points of scanning of the plurality of light beams to differ from each other when the plurality of light beams have respective wavelengths that are different from each other.

75. (New) An image forming apparatus comprising:

light source means including a plurality of light beam emitting sections;

light deflector means for deflecting a plurality of light beams emitted respectively from the plurality of light beam emitting sections;

scanning optical system means for focusing the plurality of light beams deflected by said light deflector means on at least one surface to be scanned;

first detection optical element means for converging at least one of the plurality of light beams deflected by said light deflector means as at least one detection light beam;

second detection optical element means for focusing the at least one of detection light beam converged by said first detection optical element means;

photodetector means for controlling a timing of a start of scanning of the plurality of light beams by detecting the at least one detection light beam focused by said second optical element means; and

at least one image carrier arranged on the at least one surface to be scanned,

wherein said first detection optical element has its optical surfaces arranged orthogonally relative to an arrangement direction of the at least one detection light beam, and

wherein the at least one detection light beam does not pass through any optical element having a surface that is not arranged orthogonally relative to the at least one detection light beam.

76. (New) A multibeam scanning optical apparatus according to claim 75, wherein the at least one detection light beam does not pass through said scanning optical system.

77. (New) An image forming apparatus comprising:

light source means including a plurality of light beam emitting sections;

light deflector means for deflecting a plurality of light beams emitted respectively from the plurality of light beam emitting sections;

scanning optical system means for focusing the plurality of light beams deflected by said light deflector means on at least one surface to be scanned;

photodetector means for controlling a timing of a start of scanning of the plurality of light beams by detecting at least one of the plurality of light beams deflected by said light deflector means as at least one detection light beam;

detection optical element means for converging the at least one detection light beam and leading it to said photodetector means, said detection optical element means having a refractive power in the main-scanning direction; and

at least one image carrier arranged on the at least one surface to be scanned,

wherein said detection optical element has its optical surfaces arranged orthogonally relative to an arrangement direction of the at least one detection light beam, and

wherein the at least one detection light beam does not pass through any optical element having a surface that is not arranged orthogonally relative to the at least one detection light beam.

78. (New) A multibeam scanning optical apparatus according to claim 76, wherein the at least one detection light beam does not pass through said scanning optical system.

79. (New) An image forming apparatus comprising:

light source means including a plurality of light beam emitting sections;

light deflector means for deflecting a plurality of light beams emitted

respectively from the plurality of light beam emitting sections;

scanning optical system means for focusing the plurality of light beams

deflected by said light deflector means on at least one surface to be scanned;

photodetector means for controlling a timing of a start of scanning of the

plurality of light beams by detecting at least one of the plurality of light beams

deflected by said light deflector means as at least one detection light beam;

detection optical element means for converging the at least one detection

light beam and leading it to said photodetector means; and

at least one image carrier arranged on the at least one surface to be scanned,

wherein at least one detection light beam does not pass through the scanning optical system,

wherein said photodetector means and the center of a scanning width in the main scanning direction on the at least one surface to be scanned are held optically equivalent.

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